



Explanation of Significant Differences

Marshall Landfill Superfund Site Boulder County, CO

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U.S. Environmental Protection Agency
Region 8
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1. Introduction

This Explanation of Significant Differences documents the new or changed applicable or relevant standards for ground water and surface water quality at the Marshall Landfill Superfund Site. The Site is located at 1600 South 66th Street, Boulder County, Colorado. The Site was listed on the National Priorities List in 1983, after studies identified contaminants from the landfill had leached into the surface water of Cowdrey Drainage and into the shallow groundwater beneath the site.

The remedy selected in the 1986 Record of Decision (ROD) required groundwater collection and treatment. The ROD established treatment effluent standards based upon the most restrictive of ground water and surface water Applicable or Relevant and Appropriate Requirements (ARARs) promulgated at that time. Since ground water is discharged as surface water, the resulting remediation standards address the remedy as one medium for the purposes of implementing the remedy and designing the treatment facility. However, at the time of the ROD, ground water standards did not exist for several volatile organic compounds and were not selected as ARARs for the remedial action. In addition, many of the State surface water quality standards have also been updated since the issuance of the ROD. Accordingly, the original ARARs are no longer protective of human health and the environment and the new standards must be attained to assure the remedy is protective. Therefore, performance standards that address ground water and surface water as separate media and that incorporate the newly promulgated standards are necessary to ensure that water quality remains protective of human health and the environment.

This ESD provides information about the Site history, selected remedy, and basis for the change, support agency comments, statutory determinations, and documentation of public notification compliance. The U.S. Environmental Protection Agency (EPA) is the lead agency for this ESD. The Colorado Department of Public Health and Environment has reviewed and concurred with this ESD, and State comments are summarized in Section 5 of this document. EPA will publish a notice of availability and a brief description of the ESD in a major newspaper of general circulation as required by CERCLA Section 117 and by the NCP at 40 C.F.R. Section 300.435.(c)(2)(i) (B). This ESD and supporting documents will become a part of the Marshall Landfill Administrative Record file and information repository (as required by CFR 40, Section 300.435(c)(2)(i)(A) and 300.825(a)(2)).

Comprehensive information on the Marshall Landfill Superfund Site is available at:

U.S. EPA Region 8, Superfund Records Center
999 18th Street, 5th Floor, Denver, CO 80202
(303) 312-6473 or toll free (800) 227-8917

Viewing hours: 8:00 A.M. to 4:30 P.M., Monday through Friday, excluding holidays.

and

Boulder Public Library
1000 Canyon Drive
Boulder, Colorado 80306
(303) 441-3100

Viewing hours: Monday – Thursday 9:00 am-9:00 pm, Friday – Saturday 9:00 am – 6:00 pm,
Sunday 12:00 pm- 6:00 pm

2. Site History and Contamination

The Site contains two 80-acre parcels: the Marshall Landfill to the north; and the Boulder Landfill to the south. The Site also contains portions of Cowdrey Drainage, which conveys surface water from an on-site reservoir to South Boulder Creek, and Community Ditch which at various times of the year conveys water from South Boulder Creek to Marshall Lake. Drainage from Marshall Lake flows east to the City of Louisville for use as municipal drinking water, and further east, for use as irrigation water.

The Marshall Landfill began operations in 1965 when the Richland Company (later acquired by Urban Waste Resources), under contract with Boulder County, began a solid waste composting and disposal operation. Although the contract specified composting operations, land filling was the primary method of waste handling. From 1965 until 1974, the Site accepted municipal waste, unstabilized sewage sludge, and many unknown, potentially hazardous, wastes. Wastes were disposed in Cowdrey Drainage and in septic waste ponds on the east side of South 66th Street. Urban Waste Resources later expanded the landfill to include the southern Boulder Landfill, and operated the Site until its acquisition by Browning-Ferris Industries in 1975. The parties responsible for clean up are the City of Boulder and Browning-Ferris Industries (now Allied Waste). In 1981, a County inspector reported that seeps from leachate collection ponds were flowing into Community Ditch. The Site was included on the National Priorities List (NPL) in 1983, due to concerns about the leachate release. In response, a 60-inch pressurized pipeline was installed to convey the water across the inactive landfill.

The Remedial Investigation/Feasibility Study (RI/FS) was conducted in 1986. The RI/FS identified high levels of volatile organic compounds and heavy metals in the shallow alluvial aquifer ground water beneath the Site. The RI/FS stated that contaminant concentrations in shallow ground water at the Site were higher than applicable water quality standards. Benzene, trichloroethene (TCE), tetrachloroethene (PCE), barium, and zinc were identified as the primary contaminants of concern. High levels of volatile organic compounds were subsequently detected in the surface water from Cowdrey Drainage. No contamination was identified in the deeper, bedrock aquifer.

The RI/FS also identified the sources of this contamination. These include:

- Areas of saturated refuse within the northern portion of the Boulder Landfill and throughout the Marshall Landfill;
- Trenches used for waste disposal between 1972 and 1974 at the Marshall Landfill;
- Small, undefined areas within the Marshall Landfill where industrial wastes, primarily organic solvents, were disposed along with solid wastes; and
- Two unlined leachate lagoons in the southern portion of the Marshall Landfill.

Selected Remedy

Based on these findings, EPA issued a Record of Decision in 1986. The major components of the remedy included:

- Elimination of off-site transport of contaminants emanating from the Site by constructing a drain, or series of drains, to capture shallow ground water along the entire southern and eastern site boundaries;
- Treatment of contaminated ground water in a facility consisting of equalization/sedimentation basins, an air stripper, and carbon absorption of air stripper off-gas (vapor-phase granular activated carbon, or VGAC);
- Implementation of an environmental monitoring program to verify the effectiveness of the remedial action and to assure protection of public health;
- Landfill improvements, including regrading, revegetation, perimeter ditches and fences to minimize future environmental and health impacts from the Site;
- Drainage of the existing leachate lagoons and transfer of the liquid to the treatment system; and
- Redirection of the discharge from the existing french drain into the treatment facility.

Additional investigations were carried out in 1989 and 1990. These investigations provided the information needed to design the collection and treatment systems specified in the ROD and to determine the appropriate treatment effluent standards. In 1992, based on the findings of these investigations, EPA issued an Explanation of Significant Differences that included four modifications to the ROD:

- The groundwater collection system was changed to consist of a well array along most of the eastern site boundary and a collection trench along part of the southern and eastern site boundaries instead of the series of drains specified by the ROD;
- Breakpoint chlorination/dechlorination was added to the treatment system to remove ammonia from collected groundwater prior to its discharge;
- In addition to the air stripper off-gas carbon adsorption system specified in the ROD, a liquid phase carbon absorption system (liquid-phase granular activated carbon, or LGAC) was added to remove VOCs; and
- The effluent limitation for chloride was changed from 208 mg/L to 320mg/L, after the Colorado Water Quality Control Commission modified the numeric water quality stream standard for chloride to 320 mg/L.

The landfill closed in 1991 and construction of the groundwater collection and treatment facility was completed in 1993. Since that time, the remedy is progressing as expected, and standards for treated effluent discharge for the water treatment plant are consistently met. The Second Five Year Review Report, signed September 28, 2001, found the remedy to be protective and determined that off-site migration of contaminated groundwater is controlled by the collection and treatment system. However, the report also identified several issues and recommendations related to water quality monitoring. The Second Five Year Review also identified additional ARARs that must be implemented to ensure that the remedy remains protective of human health and the environment. These ARARs address the water quality at and emanating from the Site.

3. Basis for the Document

In response to the recommendations of the Second Five Year Review, EPA is requiring the implementation of performance standards for the Marshall Boulder Landfill to ensure that ground water and surface water remains protective of human health and the environment. The ROD and subsequent Consent Decree established treatment effluent standards based upon the most restrictive of ground water and surface water ARARs promulgated at that time. Since treated groundwater is discharged into Cowdrey Drainage, the most restrictive of either groundwater or surface water standards were selected as the effluent standards. Pursuant to the Consent Decree signed in March 29, 1989, the effluent standards were later revised in the Final Remedial Design. The revisions were based upon additional treatability studies conducted during the design process. The 1989 effluent standards addressed surface water and ground water as one medium for the purpose of implementing the remedy and designing the treatment facility. However, ground water standards did not exist for several volatile organic compounds of concern at the Site at the issuance of the ROD. Accordingly, the original ARARs are no longer protective of human health and the environment and the new standards must be attained to assure the remedy is protective. In addition, many of the state surface water quality standards have also been updated. Therefore, standards that address ground water and surface water as separate media and that incorporate the newly promulgated standards are necessary to evaluate water quality and to demonstrate the protectiveness of the remedy.

Historic treatment effluent remediation standards and the updated ground and surface water standards are shown in Tables 1 and 2 respectively. The tables demonstrate that, with the exception of alternate values used for background conditions, the most restrictive of current federal or state standards will be used to measure Site performance. Pursuant to the Consent Decree, alternate values will be used to allow for the elevated background levels of iron and manganese. Technical justification and supporting data for these alternate values was presented in the Technical Memorandum: Review of Remediation Standards dated July 29, 2002. The changes selected in this ESD are consistent with the scope, performance and cost of the ROD. As a result, this modification does not alter the fundamental volume of waste to be remediated or the technology being used to implement the remedial action selected in the ROD.

Table 1
Performance Standards for Ground Water Points of Compliance

Parameter	Treatment Effluent Standards Record of Decision	Effluent Remediation Standards Final Design	Federal Primary Drinking Water Standard ¹		Federal Secondary Drinking Water Standard ²	Colorado Groundwater Standards	Ground Water Performance Standard
			MCLG ³	MCL ⁴			
TDS (mg/L)	500	—	—	—	500	400 or 1.25x Back ground	650 ⁵
Chloride (mg/L)	320 ⁶	320 ⁶	—	—	250	250	250
Sulfate (mg/L)	250	250	—	—	250	250	250
Ammonia (mg/L)	0.02	6	—	—	—	NA	0.21 ⁷
Nitrate (as N) (mg/L)	10	10	10	10	—	10	10
Nitrite (as N) (mg/L)	—	1.0	1	1	—	1	1
Arsenic (mg/L)	Zero	0.011	Zero	0.01	—	0.05	0.01
Barium (mg/L)	1	0.35	2	2	—	2	2
Cadmium (mg/L)	0.0006	0.004	0.005	0.005	—	0.005	0.005
Chromium (mg/L)	0.025	0.05	0.1	0.1	—	0.1	0.1
Copper (mg/L)	7	0.05	1.3	—	1.0	1.0	1.0
Iron (mg/L)	0.3	0.3	—	0.3	0.3	0.3	10 ³
Lead (mg/L)	0.004	0.038	Zero	—	—	0.05	0.05
Manganese (mg/L)	0.05	0.05	—	0.05	0.05	0.05	1 ⁵
Mercury (mg/L)	0.00005	0.002	0.002	0.002	—	0.002	0.002
Nickel (mg/L)	0.0154	0.05	—	—	—	0.1	0.1
Selenium (mg/L)	0.01	0.01	0.05	0.05	—	0.05	0.05
Silver (mg/L)	0.0001	0.001	—	—	0.10	0.05	0.05
Zinc (mg/L)	0.05	0.17	—	—	5	5	5
Phenols (mg/L)	3.5	Zero	—	—	—	4.2	4.2
1,1-dichloroethane (mg/L)	—	0.062	—	—	—	0.007	0.007
trans 1,2-dichloroethylene (mg/L)	0.07	0.070	0.1	0.1	—	0.1	0.1
1,1,1-trichloroethane (mg/L)	0.2	0.005	0.20	0.2	—	0.2	0.2
Tetrachloroethylene (mg/L)	Zero	0.005	Zero	0.005	—	0.005	0.005
1,1-dichloroethylene (mg/L)	Zero	0.005	0.007	0.007	—	0.007	0.007
Ethylbenzene (mg/L)	0.680	0.020	0.7	0.7	—	0.700	0.680
Toluene (mg/L)	0.34	0.025	1	1	—	1	1
Benzene (mg/L)	Zero	0.005	Zero	0.005	—	0.005	0.005
Trichloroethylene (mg/L)	Zero	0.005	Zero	0.005	—	0.005	0.005

1 Federal Primary Drinking Water Standards are legally enforceable standards that apply to public water systems. Primary standards are designed to protect public health by limiting the levels of contaminants in drinking water.

2 Federal Secondary Drinking Water Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

3 Maximum Contaminant Level Goal (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

4 Maximum Contaminant Level (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

5 Alternate Background Standards are allowable pursuant to the Consent Decree and documented in the "Technical Memorandum: Review of Remediation Standards" dated July 29, 2002.

6 Explanation of Significant Differences, 1992 USEPA which documented Colorado Water Quality modified the chloride water quality stream standard for Upper and Lower Cowdrey Drainage to 320 (mg/L). This does not impact the standard for ground water.

7. Risk Based Concentration Table value, For a single contaminant in a single medium, the RBC correspond to the target risk or hazard quotient, EPA 4/2/2002.

Table 2

Performance Standards for Surface Water Points of Compliance

Parameter	Treatment Effluent Standards (ROD)	Effluent Remediation Standards/FDS	Surface Water Performance Standard for the Upper Cowdrey (Hardness = 50)	Surface Water Performance Standard for the Lower Cowdrey (Hardness = 50)
TDS (mg/L)	500	—	—	
Chloride (mg/L)	320 ¹	320 ¹	320 ¹	320
Sulfate (mg/L)	250	250	Existing as of 01-01-00 or 250 whichever is less restrictive	Existing as of 01-01-00 or 250 whichever is less restrictive
Ammonia (mg/L)	0.02	6	N/A	0.02
Nitrate (as N) (mg/L)	10	10	10	10
Nitrite (as N) (mg/L)	—	1.0	1.0	0.05
Arsenic (mg/L)	Zero	0.011	0.05	0.05
Barium (mg/L)	1	0.35	—	
Cadmium (mg/L)	0.0006	0.004	0.01	Acute = .002 Chronic = .0013
Chromium (mg/L)	0.025	0.05	0.05	0.011
Copper (mg/L)	7	0.05	1.0	Acute = 0.007 Chronic = 0.005
Iron (mg/L)	0.3	0.3	Existing Quality as of 01-01-00 or 300 ug/l whichever is less restrictive	Same
Lead (mg/L)	0.004	0.038	Acute = 0.05	Acute = 0.03 Chronic = 0.0012
Manganese (mg/L)	0.05	0.05	Existing water quality as of 01-01-00 or 50 ug/l whichever is less restrictive(dissolved)	Same
Mercury (mg/L)	0.00005	0.002	Acute = 0.002	Chronic = 0.00001
Nickel (mg/L)	0.0154	0.05	N/A	Acute = 0.26 Chronic = 0.029
Selenium (mg/L)	0.01	0.01	Chronic = 0.01	Acute = 0.018 Chronic = 0.005
Silver (mg/L)	0.0001	0.001	Acute = 0.05	Acute = 0.0006 Chronic = 0.0001
Zinc (mg/L)	0.05	0.17	Chronic = 5.0	Acute = 0.065 Chronic = 0.066
Phenols (mg/L)	3.5	Zero	Water Standard (WS) = 4.2	Same
1,1-dichloroethane (mg/L)	Zero	0.062	WS = 0.007	Same
trans 1,2-dichloroethylene (mg/L)	0.07	0.070	WS = 0.1	Same
1,1,1-trichloroethane (mg/L)	0.2	0.005	WS = 0.2	Same
Tetrachloroethylene (mg/L)	Zero	0.005	WS = 0.005	Same
1,1-dichloroethylene (mg/L)	Zero	0.005	WS = 0.007	Same
Ethylbenzene (mg/L)	0.680	0.020	WS = 0.7	Same
Toluene (mg/L)	0.34	0.025	WS = 1.0	Same
Benzene (mg/L)	Zero	0.005	WS = 0.0012	Same
Trichloroethylene (mg/L)	Zero	0.005	WS = 0.005	Same

¹ The most stringent standard among the various designated uses is listed. For hardness-dependent standards a hardness of 50 mg/l was assumed. For metals, standards are for total recoverable concentrations unless specified otherwise.

² Explanation of Significant Differences, 1992 USEPA, which documented Colorado Water Quality decision to modify the chloride water quality stream standard for Upper and Lower Cowdrey Drainage to 320 (mg/L). This does not impact the standard for ground water.

4. Land Use Controls

Since the remedy selected in the 1986 ROD leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure, land use restrictions, also known as Institutional Controls (ICs), are necessary to ensure long-term protection the engineered remedy and to prevent future release of contamination (OSWER Directive 9355.7-04 May 25, 1995). ICs have been implemented for the Site and consist of two components. The first component is an informational device that identifies the property as a Superfund Site in the records of the Boulder County Planning Department. The device is an electronic map, which identifies the landfill boundary, and which will be referenced if any applications related to development or other changes in land are submitted to the county. The second component is a local enforcement device. The device is a prohibition on the development of the Superfund Site pursuant to the Rural Preservation Planning Area land use designation. This land use prohibition is enforceable by Boulder County and all surrounding municipalities through the Intergovernmental Agreement US 36 Interstate Corridor Comprehensive Development Plan effective June 20, 2000. Specifically, the agreement states that the municipalities "shall not grant a permit for development" for all areas with the Rural Preservation Planning Area including the Superfund Site.

5. Support Agency Comments

The Colorado Department of Public Health and Environment has reviewed the Performance Standards for Surface Water and Ground Water Points of Compliance from the Marshall Landfill into the Cowdrey drainage. The Compliance Standards listed meet all of the Colorado ground water standards and the stream standards for the upper and lower portion of the Cowdrey drainage. The State agrees that the ESD for the Marshall Landfill is appropriate, and that the remedy for the Site is protective of human health and the environment.

6. Statutory Determinations

Under CERCLA Section 121, EPA must select a remedy that is protective of human health and the environment, meets ARARs, and is cost effective. EPA believes that this modification to the ROD for Marshall Landfill is appropriate and the remedy, as changed by this ESD, will be protective of human health and the environment. The selected remedy will continue to comply with federal and state ARARs. This ESD does not fundamentally change the remedy, does not alter the volume of waste to be treated, and is cost effective. Section 121 also states that EPA must select a remedy that uses permanent solutions, alternative treatment technologies, or resource recovery technologies to the maximum extent practicable. In addition, CERCLA prefers remedies that include treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element. The Selected Remedy satisfies the statutory preference for treatment as a principal element of the remedy.

7. Public Participation Compliance

EPA provided the State of Colorado Department of Public Health and Environment with an opportunity to comment on this ESD. The State of Colorado concurs with this ESD. EPA will publish a notice in the Boulder Daily Camera newspaper that describes the ESD and its availability for review (under Section 117(c) of CERCLA, 42 U.S.C. Section 9617). Formal public comment period is not required when issuing an ESD. This ESD and all documents that support the changes and clarifications are contained in the Administrative Record of the Marshall Landfill Superfund Site (under CFR 40, Section 300.435(c)(2)(i)).

9/8/03

Dated



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References

- Arcadis G&M, 2002, Technical Memorandum: Review of Remediation Standards, Marshall/Boulder Landfill Prepared for Browning Ferris Industries and City of Boulder, July 29.
- Harding Lawson Associates, 1991, Final Design Submittal, Marshall/Boulder Landfill Remediation Project, Boulder County, Colorado. Prepared for Browning Ferris Industries and City of Boulder, July 10.
- Intergovernmental Agreement US 36 Interstate Corridor Comprehensive Development Plan, June 20, 2000.
- U.S. District Court for the District of Colorado, Civil Action NO. 99-Z-1714, U.S. of America v. Landfill, Inc. City of Boulder and others, Consent Decree. March 1989.
- U.S. Environmental Protection Agency (EPA). Second Five Year Review Report for Marshall Landfill Site, Boulder Colorado. September 2001.
- U.S. Environmental Protection Agency. Explanation of Significant Differences, Marshall/Boulder Landfill Superfund Site. November 1992.
- U.S. Environmental Protection Agency. Superfund Record of Decision, Marshall Landfill, CO. September 1986.